

WHAT IS CLAIMED IS:

1. A field apparatus control system for controlling a field apparatus connected to a field bus, comprising:

    duplicated main control units for controlling the field apparatus; and

    duplicated communication control units for processing information communication between the main control units and the field apparatus via the field bus, respectively,

    wherein one of the duplicated main control units and one of the communication control units constitute a normal system, and other of the duplicated main control units and other of the communication control units constitute a standby system and each of the normal system of communication control unit and the standby system of communication control unit have a same address on a network via the field bus, which is allocated to each of the normal and standby systems of communication control systems, and

    wherein information that is outputted to the address from the field apparatus via the field bus is transmitted to the normal and standby systems of communication control units, respectively.

2. The field apparatus control system according to claim 1, wherein each of said normal and standby systems of communication control units further comprises:

operation request transmission means, when the own communication control unit is the normal system, for transmitting an operation request to the field apparatus based on control information, said control information being transmitted from the main control unit of the own system;

means for receiving response information corresponding to the operation request transmitted from the field apparatus to the address so as to transmit the received response information to the main control unit of the own system;

means for judging whether or not failure occurs to the own system;

means for stopping operation of the own communication control unit, when the judgement means judges that failure occurs to the own system and the own communication control unit is the normal system;

means that, when the own communication control unit is the standby system, monitors the operation of the other communication control unit, which is the normal system, and, when, by the monitored result, detecting the stop of the operation of the other communication control unit, switches the own communication control unit, which is the standby system, to the normal system.

3. The field apparatus control system according to claim 1, wherein said field bus connected to the field

apparatus is duplicated, and each of said communication control units further comprises:

operation request transmission means, when the own communication control unit is the normal system, for transmitting an operation request to the field apparatus via each of the duplicated field buses based on control information, said control information being transmitted from the main control unit of the own system;

first judgment means for judging whether or not response information corresponding to the operation request is transmitted from the field apparatus via one of the duplicated field buses;

means for receiving the transmitted response information, when the first judgment means judges that the response information is transmitted, so as to transmit the received response information to the main control unit of the own system;

second judgment means for judging whether or not response information corresponding to the operation request is transmitted from the field apparatus to the address via the other one of the duplicated field buses when the first judgment means judges that the response information is not transmitted;

means for receiving the transmitted response information when the second judgment means judges that the response information is transmitted so as to transmit the

received response information to the main control unit of the own system;

means for transmitting information to indicate the generation of failure in the duplicated field buses to the main control unit of the own system when the second judgment means judges that the response information is not transmitted;

failure judgment means for judging whether or not failure occurs to the own system;

means for stopping operation of the own communication control unit, when the own communication control unit is the normal system and the failure judgment means judges that failure occurs to the local system; and

means, when the own communication control unit is the standby system, that monitors the operation of the other communication control unit, which is the normal system, and, when, by the monitored result, detecting the stop of the operation of the other communication, switches the own communication control unit, which is the standby system, to the normal system.

4. A field apparatus control system for controlling duplicated field apparatuses constituting normal and standby systems of field apparatuses, comprising:

duplicated field buses connected to the duplicated field apparatuses, respectively, said one of duplicated

field buses being referred as a normal system field bus and other thereof being referred as a standby system field bus;

    duplicated main control units for controlling the duplicated field apparatuses; and

    duplicated communication control units for processing information communication between the main control units and the duplicated field apparatuses via the duplicated field buses, respectively,

    wherein one of the duplicated main control units and one of the communication control units constitute a normal system, and the other of the duplicated main control units and other of the communication control units constitute a standby system, and the normal system of communication control unit is connected via the normal system field bus to the normal system field apparatus so that the normal system of communication control unit executes information communication processing between the main control unit of the own system and the normal system field apparatus via the normal system field bus, and

    wherein the standby system of communication control unit is connected via the standby system field bus to the standby system field apparatus so that the standby system of communication control unit executes information communication processing between the main control unit of the own system and the standby system field apparatus via the standby system field bus.

5. The field apparatus control system according to claim 4, wherein said normal system of communication control unit further comprises:

operation request transmission means for transmitting an operation request to the normal system field apparatus via the normal system field bus based on the normal system field apparatus control information which is transmitted from the main control unit of the own system;

means for receiving response information corresponding to the operation request which transmitted from the normal system field apparatus via the normal system field bus so as to transmit the received response information to the main control unit of the own system;

failure judgment means for judging whether or not failure occurs to the own system; and

means for stopping operation of the own communication control unit when the failure judgment means judges that failure occurs to the own system, and

wherein said standby system of communication control unit comprises means for monitoring operation of the other communication control unit which is the normal system so as to switch the own communication control unit which is the standby system to the normal system when detecting the stop of the operation of the other communication control unit according to the monitored result.

6. A field apparatus control system for controlling a field apparatus, comprising:

    duplicated first and second field buses connected to said field apparatus;

    a main control unit for controlling said field apparatus; and

    a communication control unit for processing information communication between the main control unit and the field apparatus via the first and second field buses,

    wherein said communication control unit further comprises

        operation request transmission means for transmitting an operation request to the field apparatus via the first and second field buses based on control information transmitted from the main control unit;

        first judgment means for judging whether or not response information corresponding to the operation request is transmitted from the field apparatus via one of the first and second field buses;

        means for receiving the transmitted response information when the first judgment means judges that the response information is transmitted so as to transmit the received response information to the main control unit;

        second judgment means for judging whether or not response information corresponding to the operation request

is transmitted from the field apparatus via other of the first and second field buses when the first judgment means judges that the response information is transmitted;

means for receiving the transmitted response information when the second judgment means judges that the response information is transmitted so as to transmit the received response information to the main control unit; and

means for transmitting information to indicate the generation of failure in the first and second field buses to the main control unit when the second judgment means judges that the response information is not transmitted.

7. The field apparatus control system according to claim 1, wherein said field bus is configured by a radio system using radio waves in a high frequency band.

8. The field apparatus control system according to claim 3, wherein said duplicated field buses are configured by radio transmissions based on radio waves which have different wavelength bands, respectively.

9. A storage medium used in a field apparatus control system for controlling a field apparatus connected to a field bus, said field apparatus control system comprising duplicated normal and standby main control units for controlling the field apparatus; and duplicated normal and

standby computers for processing information communication between the normal and standby main control units and the field apparatus via the field bus, respectively, said storage medium being readable by at least one of the normal and standby computers comprising:

means for causing at least one of the normal and standby computers to transmit an operation request to the field apparatus based on control information when the own computer is the normal computer, said control information being transmitted from the normal main control unit;

means for causing at least one of the normal and standby computers to receive response information corresponding to the operation request transmitted from the field apparatus to an address, said address being allocated to the normal and standby computers;

means for causing at least one of the normal and standby computers to transmit the received response information to the main control unit of an own system corresponding to the at least one of the normal and standby computers;

means for causing at least one of the normal and standby computers to judge whether or not failure occurs to the own system;

means for causing at least one of the normal and standby computers to, when the own computer is the normal computer and it is judged that failure occurs to the own

computer, stop the operation of the own computer; and

means for causing at least one of the normal and standby computers to monitor operation of the normal computer when the own computer is the standby computer, and when, by the monitored result, detecting the stop of the operation of the normal computer, to switch the own computer which is the standby computer to the normal computer.